

Site Need Statement

General Reference Information	
1 *	Need Title: Process Flowsheet Model
2 *	Need Code: RL-WT118
3 *	Need Summary: An integrated simulation tool is needed to assist consideration of glass durability as a function of changes in composition (due to waste feed and waste processing variability). The focus of the effort is to develop a master library of models of key unit operations, e.g., ion exchange, filtration, etc., that can be used to evaluate baseline operations impact on glass durability. The model library would be designed for use in Aspen Custom Modeler.
4 *	Origination Date: FY2002 (October 18, 2001)
5 *	Need Type: Technology
6	Operation Office: Office of River Protection (ORP)
7	Geographic Site Name: Hanford Site
8 *	Project: Waste Treatment and Immobilization Plant PBS No: RL-TW06
9 *	National Priority: <u> </u> 1. <u>High</u> - Critical to the success of the EM program, and a solution is required to achieve the current planned cost and schedule. <u> X </u> 2. <u>Medium</u> - Provides substantial benefit to EM program projects (e.g., moderate to high life-cycle cost savings or risk reduction, increased likelihood of compliance, increased assurance to avoid schedule delays). <u> </u> 3. <u>Low</u> - Provides opportunities for significant, but lower cost savings or risk reduction, may reduce the uncertainty in EM program project success.
10	Operations Office Priority:
Problem Description Information	
11	Operations Office Program Description: To perform the activities necessary to remediate the Hanford tank waste, DOE assigned responsibility to the Office of River Protection (ORP) in Richland, Washington. DOE has extended a contract for the design, construction, and commissioning of a new Waste Treatment and Immobilization Plant (WTP) that will treat and immobilize the waste for ultimate disposal. The WTP is comprised of four major elements, pretreatment, LAW immobilization, HLW immobilization, and balance of plant facilities.
12	Need/Problem Description: DOE-EM has carried out a very extensive research and technology program relative to HLW processing needs associated with the Hanford Site, Savannah River Site, Idaho National Engineering and Environmental Laboratory Site, and West Valley Demonstration Project Site. Areas of concentration have included solid-liquid separations, radionuclide separations, separations of other problem constituents (e.g., aluminum and chromium), and in HLW glass production. The data from this complex-wide research and technology program needs to be incorporated into a master library of models of key unit operations to assist in considerations of glass durability (i.e., performance assessment) as a function of changes in composition (due to waste feed and waste processing variability). The model library would be designed for use in Aspen Custom Modeler. The model library and associated data would benefit all HLW sites.
13	Functional Performance Requirements:
	Schedule Requirements:
14	Definition of Solution:
15 *	Targeted Focus Area: Tank Focus Area
16	Potential Benefits: : The major benefit is to provide a system planning tool and to perform performance assessment activities on flowsheet.
17 *	Potential Cost Savings:

18 *	Potential Cost Savings Narrative:
19	Cultural/Stakeholder Basis: The River Protection Project is committed to moving forward to design, construct, and put into operation the Waste Treatment and Immobilization Plant on the schedule agreed to in the Tri-Party Agreement. A robust program is necessary to ensure that delays, all of which are costly, are minimized. A key part of this risk mitigation is to include in the total program a capability to test with actual wastes the processes and equipment planned, or later in use.
	Technical Basis:
20	Environment, Safety, and Health Basis:
21	Regulatory Drivers: Environmental Impact Statement (EIS) for the Tank Waste Remediation System (TWRS) (DOE-RL and Ecology 1996) and the Hanford Federal Facility Agreement and Consent Order (known as the Tri-Party Agreement) and its amendments. DOE has negotiated additions to the Tri-Party Agreement that require the retrieval of single shell tanks by 2018, and the startup and operation of the WTP to support the treatment and immobilization of tank waste. By operating the WTP not only is that capability demonstrated and about 10% by volume (25% by activity) of the tank waste processed, but space is made available in the double shell tanks to allow the single shell tank retrieval to proceed without the expenditure of vast sums for additional double shell tanks. Other regulatory drivers include gathering the data necessary for the regulatory permits required for the startup and operation of the facility.
22 *	<p>Milestones: November 15, 1999 tri-party agreement on principal regulatory commitments:</p> <ul style="list-style-type: none"> • Start (Hot) commissioning-Phase I Treatment Complex 12/2007 • Start Operation-Phase 1 Treatment Complex 12/2009 • Complete Phase I-Treatment (no less than 10% of the tank waste by volume and 25% of the tank waste by activity) 12/2018 <p>Other selected TPA milestones are:</p> <ul style="list-style-type: none"> • Retrieve all SSTs 2018 • Close SSTs 2024 • Immobilize remaining tank waste 2028 • Close all tanks 2032
23 *	Material Streams: Hanford High-Level Defense Waste. The River Protection Project (formerly known as the Tank Waste Remediation System) involves PBSs RL TW-01 through TW-09. The technical, work scope definition, and intersite dependency risks for Phase 1 Waste Treatment and Immobilization is respectively, 3,3,3 on a scale of 1 to 5 where "5" represents high programmatic risk. This stream is on the critical closure path for Hanford Site cleanup.
24	TSD System: Input not required.
25	Major Contaminants: Fission products, actinides, and nitrate.
26	Contaminated Media: Tank waste consisting of supernate, (liquid), salt cake, and sludge.
27	Volume/Size of Contaminated Media: The Hanford Site has 177 underground tanks that store 204 million liters (54 M gallons) of waste containing about 190 MCi of activity.
28 *	Earliest Date Required: 11/2002 The earliest date required is in support of WTP permitting.
29 *	Latest Date Required: 11/2009 Support Hot Commissioning (which must be completed in 12/2007) and subsequent operation leading to Commercial Operation (which must be started by 12/2009).
Baseline Technology Information	
30	<p>Baseline Technology(ies)/Process:</p> <p>Technology Insertion Point(s): (as applicable)</p>
31	Life-Cycle Cost Using Baseline:
32	Uncertainty on Baseline Life-Cycle Cost: There is large uncertainty in the WTP life-cycle cost, providing the opportunity to reduce the life-cycle cost due to operation improvements as well as ensuring

	operational success not to add additional cost to the system.
33	<i>Completion Date Using Baseline:</i>
Points of Contact (POC)	
34	<i>Contractor End User POCs:</i> Paul Rutland, River Protection Project – Waste Treatment Plant, Process Technology Flowsheet, P/509-371-5213; F/509-371-5163; email: plrutlan@bechtel.com Steve Barnes, River Protection Project – Waste Treatment Plant, Research and Technology – Vitrification Technology, P/509-371-5127, F/509-371-5163, email: smbarnes@bechtel.com Reid Peterson, River Protection Project – Waste Treatment Plant, Research and Technology – Pretreatment Technology, P/509-371-5128, F/509-371-5163, email: rpeterso@bechtel.com
35	<i>DOE End User POCs:</i> R. (Rudy) Carreon, DOE Office of River Protection Project Requirements Division, 509-373-7771, F/509-373-0628, email: Rodolfo Rudy Carreon@rl.gov B.M. (Billie) Mauss, DOE Office of River Protection Program Office, 509-373-9876, F/509-372-2781, email: Billie M Mauss@rl.gov E.J. (Joe) Cruz, DOE Office of River Protection Project Requirements Division, 509-372-2606, F/509-373-1313, email: E J Cruz@rl.gov
36 *	<i>Other Contacts:</i>

*Element of a Site Need Statement appearing in IPABS-IS